

## Component 4 Social

# A structure of fishing in Rayong province in western Thailand

Tsutom MIYATA<sup>1</sup>, Sumitra RUANGSIVAKUL<sup>2</sup>, Mina HORI<sup>3</sup>, Jariya SORNKLIANG<sup>2</sup>, Thanyalak SUASI<sup>2</sup>, Rattana TIAYE<sup>2</sup>, Methee KAEWNERN<sup>4</sup>

*1 Fisheries Research Agency, Japan*

*2 Training department of Southeast Asian Fisheries Development Center(SEAFDEC/TD), Thailand*

*3 Kochi University, Japan*

*4 Kasetsart University, Thailand*

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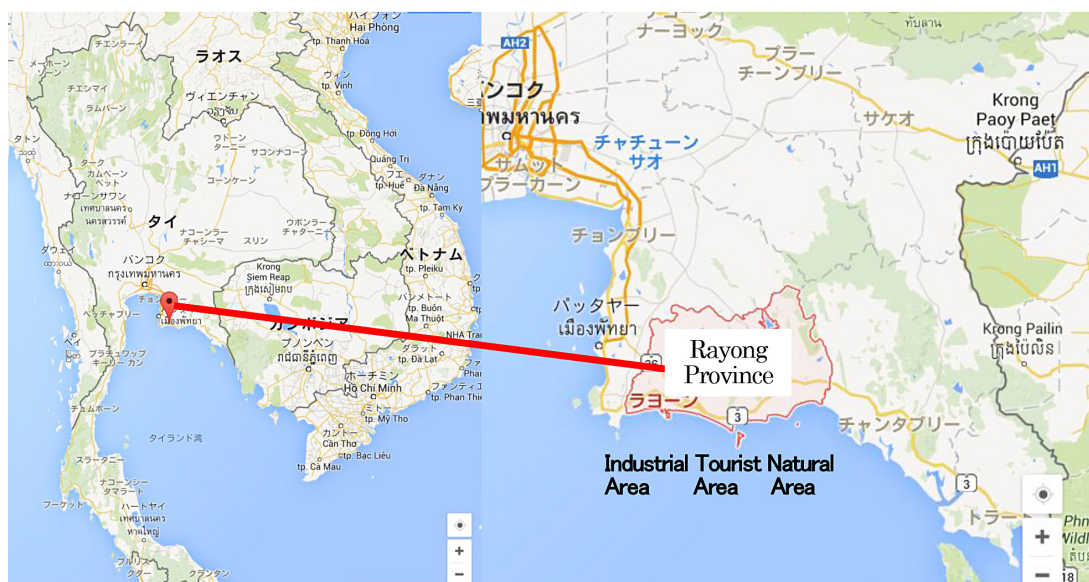
## 1. Introduction

The general direction of development in Southeast Asia is to attract firms from somewhere and construct industrial facilities for level-up living standard of local people with a destruction of nature. Now days, it needs sustainable development with harmony with nature, which is defined as Area Capability.

Therefore, we formulated the hypothesis which natural abundant area was high catch, high income, and high welfare for a fisher. And we tried to validate the hypothesis by comparison with fishing villages located in natural area, tourist area, and industrial area.

## 2. Research site

The site is Rayong province on the following map, Rayong province includes Banchang District, Muang District, and Klaeng District.



Source: Google map

### 3. Materials and Methodologies

We conducted the face to face survey with questionnaire to fishers in the research site, and collected 297 fishing household data. We divided the data by three areas where were Industrial area, Tourist area, and Natural area (The above right map) because the district fisheries officer (local government officer) advised to divide three areas to us. We employed the descriptive statistics, and the Ordered Logit and Generalized Ordered Logit for analysing a consciousness of fisher regarding welfare/happiness. The model of Ordered Logit is the following.

$$Y^* = \sum \beta'x + \varepsilon$$

$Y^*$  = unmeasured latent variable;  $X$  = independent variables

$$Y=1, \quad -\infty < Y^* < a_1$$

$$Y=2, \quad a_1 < Y^* < a_2$$

$$Y=3, \quad a_2 < Y^* < \infty$$

$Y$  = observed variable;  $a$  = threshold

$$\text{Prob}(Y=1) = \Lambda(a_1 - \beta'x)$$

$$\text{Prob}(Y=2) = \Lambda(a_2 - \beta'x) - \Lambda(a_1 - \beta'x)$$

$$\text{Prob}(Y=3) = 1 - \Lambda(a_2 - \beta'x)$$

Prob = probability;  $\Lambda$  = Logistic cumulative distribution function

Furthermore, Generalized Ordered Logit is almost same of the above, but the model is relaxed restrictions of the  $\beta'$ , and  $a_1$  and  $a_2$ , which  $\beta'$  is fixed in each Prob function, and  $a_1$  and  $a_2$  are bilaterally symmetric, because this model is better than the Ordered logit generally. It needs score test of comparison with Ordered Logit and Generalized Ordered Logit, after that, an analyst decides a model.

### 4. Results

The main target species was swimming crab and the main fishing gear was crab gill net in three areas. The high season of the fishing was from May to October and half of fishers answered high season in other months, and almost all fisher operated the fishing as low season from November to April.

The average incomes were respectively 146 thousands baht in Natural area, 205 thousands baht in Tourist area, and 266 thousands baht in Industrial area. The income in Industrial area was 1.8 times higher than the income in Natural area.

The catch and price of swimming crab in each area were the following Table 1. The average prices of each area were respectively Industrial area 189 Baht > Natural area 171 Baht > Tourist area 162 Baht. And the high seasonal catch values of swimming crab per day in each area were respectively 4,522 Baht in Industrial area > 3,828 Baht in Tourist area > 3,020 Baht in Natural area.

Table 1. The high season price and catch of Swimming Crab in each area

	Min-Price	Max-Price	Ave.-Price	Catch/day
Natural Area	150	191	171	18
Tourist Area	150	175	162	24
Industrial Area	151	227	189	24
All Areas	150	199	175	23

Sale destinations from fishers were middle person, end customer, fish retailer, and restaurant in order of the share (Table 2). And the destinations were not different from each area (Chai test).

Table 2. Sale destinations from fishers

	Middleman		Fish retailer		Restaurant		End customer		other	
Nature	32	54%	6	10%	3	5%	14	24%	4	7%
Tourist	103	61%	14	8%	13	8%	34	20%	4	2%
Industry	78	68%	13	11%	3	3%	20	17%	1	1%
All Areas	213	62%	33	10%	19	6%	68	20%	9	3%

Regarding a happiness of fisher in a present life, almost all fishers answered “Happy”, but some fishers answered others. The difference of the answer in each area was insignificant (Chi test), so we analysed pooled data by Generalized Ordered Logit.

The score test was significant, and the BIC of Ordered Logit was less than one of Generalized Ordered Logit, but the AIC of Ordered Logit was higher than one of Generalized Ordered Logit (Table 3). The Pseudo R<sup>2</sup> were respectively Ordered Logit 0.2074 and Generalized Ordered Logit 0.2535. So, we employed the results of Generalized Ordered Logit.

Variables of Finance and Health under threshold 1 were significant, and variables of Finance, Health and Constant were significant under threshold 2 (Table 3).

The satisfactions of Finance in each area were that Tourist area and Industrial area were almost same, but Natural area was different from the other areas and high score in comparison with both areas (Figure 1).

A difference of health condition of fishers in each area was insignificant (Chai test).

## 5. Consideration

Some researchers believe that closing time of the fishing operation is in monsoon season, but almost all fishers operated their fishing through all year. The main target species was swimming crab in all areas and the cheapest price area was Tourist area. We inferred that the reason of low price in the area was small size of the crab because of no difference of sale destination in each area.

The income was from 146 thousands baht to 266 thousands baht, the wage in Thailand was from 76 thousands baht to 156 thousands baht (National statistics in Thailand), the fisher's income was not bad in Thailand. However, the fishing income in Natural area was not good in Rayong province.

However, the happiness was not different from each areas. The happiness needed high Finance and Health. The Health condition in each area was no difference, but the income of household in Naturel area was lowest and almost half of income in Industrial area. Why was the happiness in each area indifferent? Because the consciousness of fisher's satisfaction for finance in Natural area was high, it was not real income but consciousness. This is important factor for happiness/welfare of a fisher.

Our hypothesis was almost invalidated, that natural area was high welfare in comparison with industrial area. But the happiness was not different from each area despite the low income of Natural area because fishers in the Natural area satisfied the financial situation in their households.

The remained research problem should be clarified a formation in detail of fisher's satisfaction for finance in Natural area.

Table 3. Results of Ordered Logit and Generalized Ordered Logit

Independent V: Very Happy 5~Very Unhappy 1 -> Very Happy 3; Happy 2; ~Very Unhappy 1									
Ordered Logit Estimates					Generalized Ordered Logit Estimates				
Number of obs = 292					Number of obs = 292				
Replications = 500					Replications = 500				
Wald chi2(6) = 48.18					Wald chi2(6) = 33.97				
Prob > chi2 = 0.0000					Prob > chi2 = 0.0007				
Log likelihood = -146.79143			Pseudo R2 =0.2074		Log likelihood = -138.264			Pseudo R2=0.2535	
	Observed	Bootstrap				Observed	Bootstrap		
	Coef.	Std.Err.	z			Coef.	Std.Err.	z	
Finance	0.461	0.090	5.150	***		0.799	0.255	3.13	***
Anxiety	0.763	0.318	2.400	**		1.251	3.083	0.41	
Hope	0.109	0.136	0.800			-0.187	0.294	-0.64	
Health	0.571	0.194	2.950	***		0.830	0.364	2.28	**
Nature	-0.240	0.503	-0.480			-0.417	1.673	-0.25	
Industry	-0.445	0.357	-1.250			-0.570	0.667	-0.86	
Constat						-3.958	3.664	-1.08	
a1	2.320	0.876	2.647	**	Finance	0.28	0.10	2.73	***
a2	8.142	1.195	6.812	***	Anxiety	0.52	0.40	1.31	
					Hope	0.30	0.20	1.48	
					Health	0.46	0.27	1.69	*
					Nature	-0.04	0.92	-0.05	
					Intustry	-0.13	0.49	-0.26	
					Constat	-6.68	1.57	-4.26	***
AIC:	309.5829	BIC:	338.9969		AIC:	304.5283	BIC:	356.0029	
Score Test		Likelihood-ratio test LR chi2(6)=17.46							
		(Assumption:constrained nested in unconstrained) Prob>chi2=0.007							
Finace,very dissatisfaction 1~complete satisfaction 10; Anxiety,Yes 1, No 2									
Hope, Much 4,Some 3, Litte 2,None 1; Health,Very good 4, Good 3, So-so 2, Bad 1									

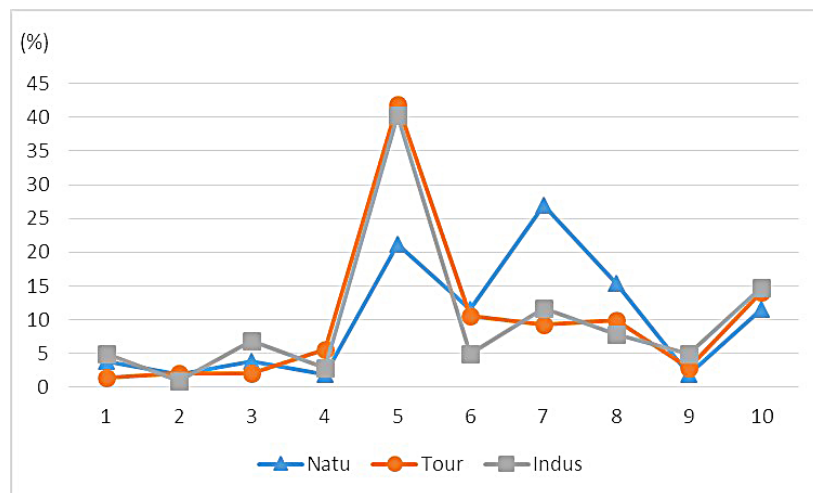


Figure 1. Satisfaction for finance in present time